

List of Indiana Department of Transportation (INDOT) FY 2019 Research Needs (as of November 2, 2018)

Instructions: This listing is for use by Faculty from accredited Indiana Universities. For additional information or to express an interest in a Research Need listed, please contact the JTRP Program Director at snourelidin@indot.in.gov. If expressing an interest in a Research need, attach your CV/resume to your email response.

#	Status	SPR	Submitter	Working Title
1	Awarded	4002	Cai	Risk-based Specification for Construction
2	Awarded	4126	Habib	Implementation of Li-DAR-Based Mobile Mapping System for Lane Width Evaluation and Report in Work Zones for INDOT Traffic Management
3	Awarded	4153	Boruff & Kramer	INDOT Highway Lighting Support Services
4	Approval Pending	4206	Geotech	MSE Wall Reinforcement Corrosion Evaluation
5	Awarded	4300	Holowaty	Investigation of Durability and Performance of High Friction Surface Treatment
6	Approval Pending	4301	Watson Lowther Platner	Assessment of an Offset Pedestrian Crossing for Multilane Arterials
7	Awarded	4302	Holowaty	Use of Emerging & Extraordinary Data Sources as Means to Improve Traffic Safety
8	Awarded	4305	Sturdevant	Development of Automated Incident Detection System Using Existing ATMS CCTV.
9	Awarded	4306	Sturdevant	Back of Queue Warning and Critical Information Delivery to Motorists
10	Awarded	4308	Fitzgerald	Investigation of Strategic Deployment Opportunities for UAS
11	Awarded	4309	Bowman	Pack Rust -- Mitigation Strategy Effectiveness
12	Awarded	4310	Hunter	Legal and Permit Load Evaluation for Indiana Bridges
13	Awarded	4311	Thrall	Determination of reserve strength of bridges (effect of railings) and how conservative is the design
14	Awarded	4314	Gkritza	Feasibility Study of Electric Roadways in Indiana
15	Awarded	4315	Bullock	Develop and Deploy a Safe Truck Platoon Testing Protocol for the Purdue ARPA-E Project in Indiana
16	Proposal Pending	4318	Fowler	Beveling edge of Center Line of Concrete Pavement Joint to prevent 90 degree to prevent Failing of RPMs due to proximity.
17	Proposal Pending	4319	Fowler	Cost - benefit analysis of installing conduit for fiber optic on our projects.
18	Awarded	4320	Smith	Implementation of Epoxy Injection for Bridge Deck Debonding Mitigation
19	Awarded	4321	Brooks, Zhou, Lu	Evaluation of our current and other available anti-icing/de-icing products under controlled environmental conditions to test effectiveness.

20	Proposal Pending	4322	Brooks	Development of an intelligent Snowplow Truck that integrates telematics technology, roadway sensors, and connected vehicle technology. (Potential STIC funding of \$100,000).
21	Awarded	4323	Brooks & Sturdevant	Extraction of Vehicle "CAN bus" Data for Enhance Winter Roadway Condition Monitoring
22	Approval Pending	4325	Beeson	Development of Volumetric Acceptance and Percent Within Limits (PWL) Criteria for Stone Matrix Asphalt (SMA) Mixtures in Indiana
23	Awarded	4326	Lu	Self-Healing Concrete for Link Slabs.
24	Approval Pending	4327	Becker	Development of Compaction Guidelines for Aggregate Drainage Layers and In situ Permeability testing methods for aggregates.
25	Awarded	4329	Becker & Salgado	Verification Testing of MSE Wall foundation bearing capacity based on the DCPT
26	Approval Pending	4332	Holtz	Performance Related Specification for Pavement Milling
27	Awarded	4334	Bobet	Improved Reliability of FWD tests results and Correlation with Resilient Modulus.
28	Approval Pending	4335	Haddock	Environmentally Tuning Asphalt Pavements Using Phase Change Materials
29	Approval Pending	4336	Olek	Improvement of scaling resistance of pavement concrete using titanium dioxide (TiO ₂) and other nano-additives
30	Awarded	4337	Sinfield	Synthesis Study: Overview of Readily Available Culvert Inspection Technologies - Phase 2
31	Does Not Need Funding		Feagans	Durability & Cost Effectiveness Joint Repair for Pavements and Bridges
32	Does Not Need Funding		Fowler	DDC-5: Traffic Markings -- not as visible as they should be (paint disappears in dark/rain). DDC-6: Rumble striping maintenance -- holding water, reduces visibility & speeds deterioration of pavement.
33	Does Not Need Funding		Harris	This research is generated from information obtained from the INDOT surveying department. Currently, there are 5 chapters in the IDM that cover some portions of our survey procedures and consultant deliverable requirements, but it is in need of an update. The INDOT surveying department would like to create a stand-alone document to include the current IDM information, with additional information to make it a bit more comprehensive, including incorporating our Photogrammetric Services manual, as well as adding/updating information that reflect current technologies, e.g. mobile/static scanning, UAV, GNSS, coordinate systems, etc.
34	Under Consideration		Boruff	Traffic Volume limits of Driveway Assistance Devices at Temporary Traffic Signals
35	Under Consideration		Purdue	CDB – Support for Input Data Preparation

36	Under Consideration		Sturdevant	Traffic Signal "Split Failure" Dashboard Development for Systematic Intersection Performance Management
37	Under Consideration		Dunston	Effect of construction quality on long term bridge performance how to tie to asset management
38	Under Consideration		Lu	Bridge Monitoring with Printed Sensors
39	Under Consideration		Becker	Freeze-Thaw Durability of Chemically Modified Subgrades
40	Under Consideration		Salgado and Spahr	Development of Protocols for Reuse Assessment of Existing Foundations in Bridge Rehabilitation and Replacement Projects. Appropriate Re-Use of Existing Foundations Life Expectancy?
41	Under Consideration		Salgado	Load-Carrying Capacity of Cap-Pile Group-Soil System
42	Under Consideration		Wilczynski	Construct a diorama of a construction site and/or of facilities for educational and outreach purposes specifically related to the required inspections for Rule 5 sites. Construction sites over 1 acre require a Rule 5 permit from IDEM, part of this is that it requires storm water, erosion, sediment control measures must be inspected weekly and after every 0.5 inch rain event. We could have real world examples of well-constructed, poorly-constructed, appropriate and inappropriate Best Management Practices (e.g. silt fence, filter sock, sediment traps, check dams) that were interchangeable to do quizzes and examples. Or we could create one related to our Rule 13 permit facility permit requirements, where we have to inspect facilities for storm water related measures, such as containing pollutants like salt, paint, oil etc. I think this could help as I know one of the issues I have with the classes I do for my people is that it's hard to convey what to look for with pictures on a PowerPoint. Some states also have a "living" construction site for real world training on erosion control, similar to the area Purdue has set up for mock bridge inspections. After a little discussions with the Indiana MS4 partnership they showed interest in the idea. That's definitely a large long term project but it's an idea that could be worth discussion if I could find a way to put the right people together. The Indiana MS4 partnership is a not-for-profit that runs the annual meetings for all the county/city MS4s and has money left over they're looking to use to provide training opportunities.
43	Under Consideration		Safety Director	Basic Safety Health Precautions for Pipe Repair Issues.
44	Under Consideration		Flora	Determination of Remaining Service Interval (RSI)/Pavement Capacity in Terms of Functional and Structural Condition

45	Under Consideration		Fowler	Smart/interconnected signals (Jasper) In an effort to determine how Smithville Fiber would connect to Smart Signal equipment, I contacted SURTRAC (Scalable URban TRAffic Control) for information on their product. Big takeaways: 1. SURTRAC equipment is placed in signal control cabinet. 2. Fiber connects to equipment in signal control cabinet. 3. Video detection used for traffic information. 4. Cost is \$20,000 per signal and includes equipment, installation, software, updates and maintenance for life.
46	Under Consideration		Brooks	Evaluation of grass seed growth in various soil conditions with the goal to improve vegetation growth after a ditching operations.
47	Under Consideration		Feagans	Safety Considerations for Profile Milling of Pavements and Bridges to improve smoothness (IRI)
48	Under Consideration		Feagans	Best Practices for Thin Deck Overlays
49	Under Consideration		Feagans and Frosch	Integral abutment sleeper slab joint .Best Practices of Relief Joints for concrete pavements & Bridges
50	Under Consideration		Khan	Use of Piezocone Penetration Test to Estimate In Situ Consolidation Parameters
51	Under Consideration		Holowaty	Minor Cost Traffic Device and Safety Systemic Program Effectiveness Evaluation
52	Under Consideration		Laracuent Lowther	Speed Management in Work Zones (illusions)
53	Under Consideration		Steckler	Safety Performance of Barrier End Treatments, Cushions, and Impact Attenuators
54	Under Consideration		Plattner	Effectiveness of "Yield to Pedestrians in Crosswalks"
55	Under Consideration		Watson	Adding LED street lighting to all rural traffic signals
56	Under Consideration		Holowaty	Guidelines for Evaluating Safety using Traffic Conflicts and Other Surrogate Measures
57	Under Consideration		Lowther	Rural Intersection Warning System
58	Under Consideration		Steckler	Solar Energy as Power Source for Traffic Signals
59	Under Consideration		Bough	Intersection Signal Designs
60	Under Consideration		Lowther	Lane/shoulder utilization
61	Under Consideration		Steckler Ford	Pavement Marking Durability and grooving
62	Under Consideration		Plattner	"Prepare to Stop When Flashing" active control devices
63	Under Consideration		Plattner	Safety impact of dual lane roundabouts vs. single lane
64	Under Consideration		Boruff	Selection, and Installation of a Test Site for Solid State Luminaires

65	Under Consideration		Watson	Vegetation Policy for Urban Corridors
66	Under Consideration		Boruff	Design Criteria specifically for Solid State Lighting
67	Under Consideration		Holderread	Permanent Transverse Rumble Strips
68	Under Consideration		Plattner	Detector life cycle cost comparisons
69	Under Consideration		McCoy VanVleet	Effect of Acceleration Lane Downstream of On- to Off-Ramp Weave Areas
70	Under Consideration		Plattner	Power outages at traffic signals
71	Under Consideration		Boruff	Replacement Cycles for Special Markings
72	Under Consideration		Laracuent	Desirable Traversable Gore and Acceleration Lane Length for High Speed On-Ramps
73	Under Consideration		Laracuent	Deceleration Areas at Median Crossovers on High Speed Divided Facilities
74	Under Consideration		Watson	Red/Yellow overhead flashing intersection beacons
75	Under Consideration		Lowther	RPM technology
76	Under Consideration		Laracuent	Freeway on-ramps acceleration lane vs. yield control from a work zone perspective
77	Under Consideration		McCoy VanVleet	Traffic Safety & Capacity in Relation to Interchange Ramp Grade & Curvature
78	Under Consideration		Holderread	Roadside Encroachment on Two-Lane Rural Roads
79	Under Consideration		Holderread	Pavement Markings on Chip-Seal Pavement Surface
80	Under Consideration		Purdue	VISSIM for Safety Evaluation
81	Under Consideration		Post	Update of deterioration curves (current inspection data). INDOT, Bridge Division staffs have gathered treatment history for each bridge in 2016-2017. The treatment history will be used to program projects and will be incorporated into dTIMS (BMS software) to recommend bridge improvement projects. Since Purdue University as part of SPR 3828 has developed new deterioration models (curves) and currently implemented into dTIMS it is reasonable to study the bridge treatment history data available through INDOT, Bridge Inspection Section and adjust the current deterioration models (curves) if necessary. The bridge treatment history shows the age and treatment types applied to each bridge components over the life of the bridge. The proposed research should find the correlation and relationship between the inspection history which was used to develop the models (curves) and the actual treatment history which the bridge components have received over the period of time.

82	Under Consideration		Connor	Internal redundancy; how to implement the recently completed study (going to AASHTO Ballot soon for a guide spec)
83	Under Consideration		Spahr	Tiered Approach to Design i.e. North vs South, Interstate vs County Road Over
84	Under Consideration		Bowman	ABC for Steel Structures: Short Span, Design Details, Bearing
85	Under Consideration		Bailey	Evaluation of peak flow design methods for Indiana
86	Under Consideration		Bailey	Use the NCHRP study for Joint Probability Analysis of main stream vs tributary to come up with a tool that can be used by engineers.
87	Under Consideration		Shan	Understand Road Conditions from Social Media
88	Under Consideration		Siddiki	Resilient Modulus Streamlining
89	Under Consideration		Shan	Develop a Flowchart for Digitizing INDOT Right of Way. INDOT would like to research the best practices and possible workflows for constructing GIS layer(s) that depicts INDOT right of way and parcel boundaries. The research would include capturing temporal changes to the right of way. This would also include reviewing best practices from other states and interviewing potential use cases. The results would be a proposed workflow that can be implemented by INDOT, including estimated cost, potential risk, and potential return on investment report for implementation.
90	Not approved for funding		Const. Manage.	Post Construction mandrel testing flexible pipe.
91	Not approved for funding		Const. Manage.	Development of a Pavement Acceptance Specification Utilizing Deferred Incentive Payments Based on Measured Condition Data
92	Not approved for funding		Purdue	Protocol for Assessing the Impact of Initial Construction Quality on Long-Term Asset
93	Not approved for funding		INDOT R&D	Improved Specification for Intelligent Compaction
94	Not approved for funding		INDOT R&D	In Situ Moisture Content Determination by Geophysical Methods
95	Not approved for funding		INDOT R&D	Determining Design Parameters from Cone Penetration Testing
96	Not approved for funding		Purdue	Plastics Technologies for New and Rehabilitated Culvert Infrastructure
97	Not approved for funding		INDOT Pavement	Use of "Concrete Works" Software to Predict Maturity in Patching PCCP
98	Not approved for funding		Purdue	Digital Inspection Documentation and Inspector Training
99	Not approved for funding		Purdue	Quality Measure and Pay Factor
100	Not approved for funding		Purdue	Harvesting Social Media Data and Autonomous Vehicles Data to Assess Infrastructure Needs
101	Not approved for funding		Purdue	Implementing a Performance-Based Grading System for Emulsified Asphalts in Indiana

102	Not approved for funding		Purdue	Use of Thermal Imaging to Improve Asphalt Pavement Performance
103	Not approved for funding		Purdue	Design of Piles in Gravelly Soils
104	Not approved for funding		Purdue	Estimation of Shaft Resistance of Pile Driven in Predrilled Holes
105	Not approved for funding		Purdue	Refining Asphalt Pavement Warranties for Indiana
106	Not approved for funding		Purdue	A data-driven holistic approach to safety analysis for informed decision making to minimize roadway crash risks
107	Not approved for funding		Purdue	Systematic Prioritization for Deferred Maintenance
108	Not approved for funding		Purdue	Expediting Utility Relocation to Reduce Delays on INDOT projects
109	Not approved for funding		Purdue	Evaluating Impact of Traffic Control Strategies on Construction Planning and Scheduling vs. Work Zone Safety
110	Not approved for funding		Purdue	Determination of Voids in the Mineral Aggregate and Aggregate Skeleton Characteristics of Asphalt Mixtures Using a Linear-Mixture Packing Model
111	Not approved for funding		Purdue	Cracking Resistance Evaluation of Asphalt Pavements with the Effect of Aging
112	Not approved for funding		Purdue	Shortening of the construction window for concrete pavements: Improved methods for predicting mechanical properties of concrete at early ages
113	Not approved for funding		Niazi	Expediting Geotechnical Investigations with latest investigative tools for improved accuracy of results
114	Not approved for funding		Niazi	Optimizing the Use of Shear Wave Velocity in Geoengineering Problem Solving
115	Not approved for funding		Prezzi	Design strategies to minimize differential settlement in road-widening projects.
116	Not approved for funding		Prezzi	Design of piles accounting for negative skin friction.
117	Not approved for funding		Salgado	LRFD-based design of bridge piles subjected to lateral loads.
118	Not approved for funding		Dunlop	Additional Collaboration Purdue and INDOT regarding ORB and SPR 4200
119	Proposal Pending		Gkritza / Fowler	Synthesis Study: Facilities Enterprise Development, Sponsorship/Privatization. Expansion to include Energy Harvesting on INDOT Right-of-Way.